JAPANESE [JP,2001-216686,A]

CLAIMS DETAILED DESCRIPTION TECHNICAL FIELD PRIOR ART EFFECT OF THE INVENTION TECHNICAL PROBLEM MEANS DESCRIPTION OF DRAWINGS DRAWINGS

[Translation done.]

* NOTICES *

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CLAIMS

[Claim(s)]
[Claim 1] The reflective film is formed on at least one substrate, a dielectric film is formed on the above-mentioned reflective film, the thermal control film is formed on the above-mentioned dielectric film, and direct record film is formed on the above-mentioned thermal control film. With the above-mentioned substrate by the optical exposure from an opposite hand It is the optical record medium which is an optical record medium with which either [at least] informational record or playback is made, and is characterized by the above-mentioned thermal control film consisting of an AgPdCu alloy thin film.
[Claim 2] Surface roughness Ra of the thermal control film is an optical record medium according to claim 1 characterized by being 0.75nm or less.
[Claim 3] It is the optical record medium according to claim 1 which surface roughness Ra of the thermal control film is 0.75nm or less, and is characterized by surface roughness Ra of the reflective film being 0.75nm or less.
[Claim 4] The reflective film is an optical record medium according to claim 1 characterized by consisting of an AgPdCu alloy thin film.
[Claim 5] The reflective film is an optical record medium according to claim 2 characterized by consisting of an AgPdCu alloy thin film.
[Claim 6] The reflective film is an optical record medium according to claim 3 characterized by consisting of an AgPdCu alloy thin film.
[Claim 7] The reflective film is an optical record medium according to claim 1 characterized by consisting of an AgPdCuAl alloy thin film.
[Claim 8] The reflective film is an optical record medium according to claim 2 characterized by consisting of an AgPdCuAl alloy thin film.
[Claim 9] The reflective film is an optical record medium according to claim 3 characterized by consisting of an AgPdCuAl alloy thin film.

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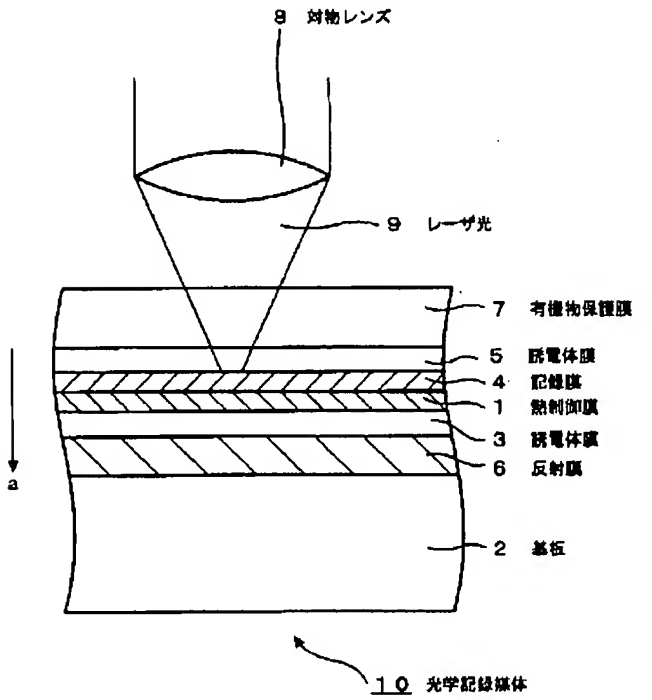
DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the sectional view showing one example of the optical record medium concerning this invention.
[Drawing 2] When the thermal control film is AgPdCu or aluminum, it is drawing having shown the relation of an elimination noise level and a frequency in case there is no thermal control film in a list.
[Drawing 3] It is the sectional view showing the conventional example of a magneto-optic-recording medium.
[Description of Notations]
1 [.. Record film, 5 / .. A dielectric film, 6 / .. The reflective film, 7 / .. An organic substance protective coat, 8 / .. An objective lens, 9 / .. Laser beam 10 / .. Optical record medium] .... The thermal control film, 2 .. A substrate, 3 .. A dielectric film, 4

[Translation done.]

Drawing selection Representative drawing



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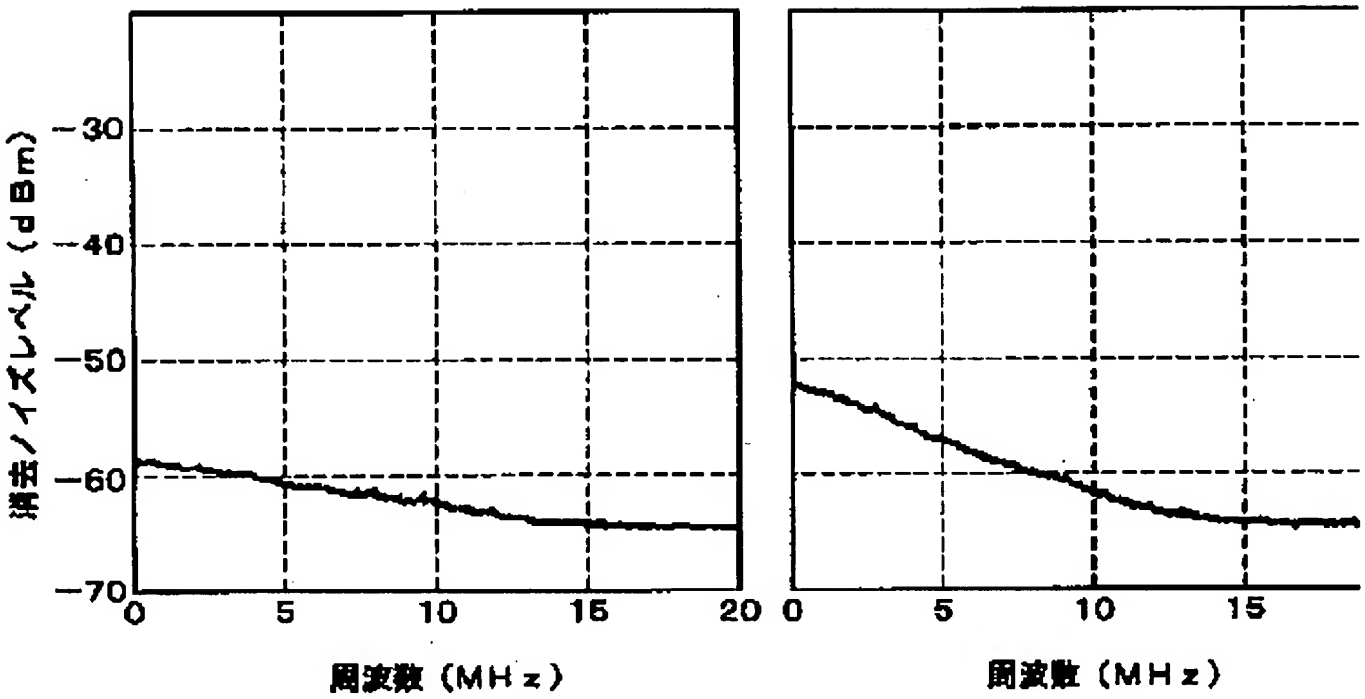

A　熱制御膜；AgPdCu　　B　熱制御膜；Al

Miki Takeshi

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to an optical record medium.
[0002]
[Description of the Prior Art] In recent years, the optical record medium attracts attention as a high-density record medium. Among the conventional optical record media, it comes to carry out the laminating of a dielectric film, the record film which consists of a magnetic film, a dielectric film, and the reflective film which consists of a metal on the transparent substrate which consists of a polycarbonate etc. one by one, and a magneto-optic-recording medium irradiates a laser beam from a transparent substrate side, and is made to perform record and playback of a signal.
[0003] In this optical record medium, although short wavelength laser (blue laser) was used as a laser beam or cutback-ization of the diameter of a laser beam spot was made using the optical system of high numerical aperture (NA) in order to have raised that recording density, the energy density of the laser beam spot in record film became very high in this case, car angle-of-rotation thetak at the time of playback decreased, and there was a problem that a signal property deteriorated. If car angle-of-rotation thetak decreases and also this becomes an elevated temperature by becoming an elevated temperature by the exposure of a high density laser beam, since the magnetic recording of record film will disappear, a signal property deteriorates.
[0004] On the other hand, the report that the temperature rise of record film was able to be controlled and the above-mentioned problem was able to be solved is carried out to the substrate of record film by forming in the field of an opposite hand directly the thermal control film which consists of Ag, aluminum, etc. (Japanese Patent Application No. No. 26521 [11 to]).
[0005] In this case, by the usual magneto-optic-recording medium which irradiates a laser beam, and is recorded and reproduced from a substrate side, the laminating of the film configuration is carried out to the order of a substrate, dielectric films (SiN etc.), record film (TbFeCo etc.), thermal control film (Ag, aluminum, etc.), dielectric films (SiN etc.), and metallic reflection film (aluminum etc.). That is, since the laminating of the thermal control film is carried out on it after record film is formed, the thermal control film does not affect a record film substrate.
[0006] On the other hand, the magneto-optic-recording medium described below was developed for the further high density record. It comes to carry out the laminating of the reflective film, a dielectric film, record film, a dielectric film, and the organic substance protective coat for example, at a substrate top one by one, and this is the so-called surface reading magneto-optic-recording medium which attained cutback-ization of spacing of a lens system and record film as a substrate carried out convergent radiotherapy of the laser beam through a lens system from the organic substance protective coat side of an opposite hand and performed record and playback of a signal.
[0007]
[Problem(s) to be Solved by the Invention] However, when it is going to form the thermal control film in this surface reading magneto-optic-recording medium, as shown in drawing 3 , a film configuration

will carry out a laminating to the order of a substrate 2, the reflective film 6 (Ag alloy etc.), dielectric films 3 (SiN etc.), the thermal control film 1 (Ag, aluminum, etc.), record film 4 (TbFeCo etc.), and a dielectric film 5 (SiN). Therefore, the thermal control film 1 turns into substrate film of record film 4, and the surface roughness affects a disk noise. Here, after forming the thermal control film 1, such as Ag and aluminum, the smooth side with which has a limitation as drawing and it is satisfied of smoothing of the front face with a reverse spatter cannot be acquired.

[0008] Thus, since the laminating of the record film 4 will be carried out on this after forming the thermal control film 1 when the thermal control film 1 is formed in two fields of record film 4 inside in the field by the side of a substrate 2, the thermal control film 1 serves as a substrate of record film 6. For this reason, when Ag, aluminum, etc. are used as construction material of the thermal control film 4, there is a problem that disk noises, such as an elimination noise, increase for that surface roughness.

[0009] In addition, the noise when reproducing, after impressing the field to the one direction from the exterior and arranging the sense of magnetization of a recording layer with an elimination noise in the one direction, Or the noise when reproducing, after having made the sense of the impression field from the outside into the time of record and the reverse sense, having made the noise when reproducing it after converging and irradiating a laser beam, or the sense of the impression field from the outside into the time of record and the reverse sense, converging and irradiating the laser beam and eliminating a record signal is said.

[0010] This invention is made in view of such a technical problem, and it aims at offering the optical record medium which can reduce a disk noise while it can improve a heat characteristic.

[0011]

[Means for Solving the Problem] The reflective film is formed on at least one substrate, a dielectric film is formed on the reflective film, the thermal control film is formed on a dielectric film, direct record film is formed on the thermal control film, it is the optical record medium with which, as for the above-mentioned substrate, either [at least] informational record or playback is made by the optical exposure from an opposite hand, and, as for the optical record medium of this invention, the above-mentioned thermal control film consists of an AgPdCu alloy thin film.

[0012] Moreover, the optical record medium of this invention selected surface roughness Ra of the thermal control film mentioned above to 0.75nm or less. Moreover, the optical record medium of this invention sets to 0.75nm or less surface roughness Ra of the thermal control film mentioned above, and sets surface roughness Ra of the reflective film to 0.75nm or less further. Moreover, the optical record medium of this invention constitutes the reflective film with an AgPdCu alloy thin film. Or an AgPdCuAl alloy thin film constitutes the reflective film.

[0013] According to the optical record medium of this invention mentioned above, direct record film is formed on the thermal control film, a substrate is an optical record medium with which informational record or playback is made by the optical exposure from an opposite hand, and the thermal control film which has smooth front-face nature with high thermal conductivity is obtained by using an AgPdCu alloy thin film as thermal control film.

[0014]

[Embodiment of the Invention] Hereafter, the gestalt of implementation of invention concerning an optical record medium is explained, referring to drawing 1 and drawing 2 . Drawing 1 is the sectional view showing one example of the optical record medium concerning this invention. In drawing 1 , the optical record media 10 are MO media which consist of a surface reading magneto-optic-recording medium. Moreover, the optical record medium 10 consists of a substrate 2, the reflective film 6, a dielectric film 3, the thermal control film 1, record film 4, a dielectric film 5, and an organic substance protective coat 7 so that drawing 1 may show.

[0015] The thickness of 0.1-1.2mm of a substrate 2 is disc-like. This substrate 2 consists of transparent ingredients, such as glass, a polycarbonate, acrylic resin (for example, polymethyl methacrylate (PMMA)), and an epoxy resin. However, it may not necessarily be limited to a transparent ingredient and you may be an opaque ingredient. Moreover, a substrate 2 has the function which supports the various thin films by which a laminating is carried out on this.

[0016] The reflective film 6 is formed on the substrate 2. The reflective film 6 is a thin film with the thickness of the range of 30-100nm. Ag alloys, such as AgPdCu and AgPdCuAl, etc. are used as construction material of this reflective film 6. In addition, the construction material of the reflective film 6 is not necessarily limited to Ag alloys, such as these AgPdCu(s) and AgPdCuAl, etc. In addition, anythings are employable if it has a high reflection factor and thermally conductive and smooth high front-face nature. Moreover, the reflective film 6 consists of a metal, monolayer film of an alloy, or two or more cascade screens. This reflective film 6 has the function to reflect the laser beam which has passed record film (it mentions later), and to pass record film again.
[0017] The dielectric film 3 is formed on the reflective film 6. This dielectric film 3 has the thickness of 150nm or less. Moreover, the dielectric film 3 consists of SiO2, the Tb addition SiO2, SiN, AlNx, Y2 O3, aluminum 2O3, ZnS, etc. This dielectric film 3 has the function which has the function to prevent oxidation of the record film which is easy to rust, and reinforces apparent car angle-of-rotation thetak according to the effectiveness of a multiple echo and interference (enhancing). In addition, it does not care about a dielectric film 3 that it is what consists not only of what consists of monolayer film but of a cascade screen more than two-layer.
[0018] The thermal control film 1 is formed on the dielectric film 3. This thermal control film 1 consists of thin films, such as Ag alloys, such as AgPdCu. This AgPdCu alloy has high thermal conductivity, and it has the description that surface roughness is small. As for this thermal control film 1, it is desirable to have the thickness of the range of 6-20nm. It is because formation of the uniform film is difficult and diffusion of heat becomes less enough, when the thickness of the thermal control film becomes thinner than 6nm. Moreover, it is because there is a possibility that diffusion of heat may become large too much and record may become impossible to satisfaction when thickness becomes thicker than 20nm although diffusion of heat can be enlarged if the thermal control film is thickened.
[0019] On the thermal control film 1, record film 4 is formed directly. This record film 4 has the thickness of the range of 5-30nm. Moreover, record film 4 consists of amorphous rare earth-transition-metals alloys, such as TbFeCo and GdFeCo, etc. While record film 4 heats locally the part which wants to record the magnetization direction on a film surface in the film (henceforth "perpendicular magnetic anisotropy films") which is perpendicularly suitable by the laser beam, by the ability giving the field of hard flow, magnetization of the part is reversed and a bit is recorded. In addition, it does not care about record film 4 that it is what consists not only of what consists of monolayer film but of a cascade screen more than two-layer.
[0020] The dielectric film 5 is formed on record film 4. This dielectric film 5 has the same thickness as the dielectric film 3 mentioned above, construction material, and a function.
[0021] The organic substance protective coat 7 is formed on the dielectric film 5. This organic substance protective coat 7 has the thickness of 100 micrometers or less. Moreover, the organic substance protective coat 7 consists of ultraviolet curing mold resin. While preventing that the organic substance protective coat 7 is exposed to external environments, such as oxygen and moisture, in the dielectric film 5 under this film, record film 4, the thermal control film 1, a dielectric film 3, and the reflective film 6, it has the function of preventing that the contaminant, dust, etc. to a dielectric film 5 adhere, and preventing getting damaged when these cascade screens contact other bodies further. In addition, even if it is the case where the organic substance protective coat 7 is not formed, the object of this invention can be attained.
[0022] The approach of record and playback at the time of next using the optical record medium concerning this invention is explained. In the optical record medium 10 of drawing 1 , the laser beam 9 is irradiated from the opposite hand in the substrate 2. By the heat of absorption of this laser beam 9, record film 4 is heated more than Curie temperature. Heating of record film 4 of even the temperature beyond Curie temperature reduces extremely the coercive force of the record film 4 magnetized till then. It records on record film 4 using this phenomenon by making the sense of magnetization of coercive force into a forward reverse binary system.
[0023] Simultaneously with the laser beam 9 which brings about heating more than Curie temperature, the magnetization direction of the direction of a which had attained to the record film 4 whole impresses

the field of the reverse sense before it. If a laser beam 9 is intercepted, record film 4 will return from an elevated temperature to ordinary temperature, but if the amorphous rare earth-transition-metals alloy etc. is used for record film 4, it will get cold, with the direction of an impression field at the time of Curie temperature recorded. Therefore, the sense of magnetization of only the part to which the laser beam 9 and the external reversal field were impressed simultaneously of coercive force is reversed, and informational record is performed. The recorded signal is eliminable, if the sense of the impression field from the outside is carried out in the direction of a and a laser beam is converged and irradiated again.
[0024] When reproducing the recorded signal, unlike the case of elimination, the property as a wave of a laser beam 9 is used for a record list. Although the laser beam injected from semiconductor laser is generally a good linearly polarized light, in order to improve linearly polarized wave nature further, also making the record film of an optical record medium irradiate is performed through the polarizing plate. Since the plane of polarization of the laser beam reflected from record film 4, i.e., the oscillating direction of light, rotates to an opposite direction mutually with the sense of magnetization of record film 4, informational playback is performed by detecting the rotational sense. The magnetic Kerr effect in the case of the reflected light and the Faraday effect in the case of the transmitted light are used for the interaction of the light wave in the case of this recording information playback, and a field, i.e., the magneto-optical effect. In addition, if it is in the optical record medium concerning this invention, either [at least] informational record or playback can be carried out.
[0025] The optical record medium 10 shown in drawing 1 is a surface reading magneto-optic-recording medium, as mentioned above. According to this surface reading magneto-optic-recording medium, high density record is attained. Thus, the reason whose high density record is attained is that it can make small beam-spot size in the focus of a lens since the numerical aperture (NA) of a lens can be enlarged by making thickness of an organic substance protective coat thinner than the thickness of a substrate.
[0026] Here, as mentioned above, when it used short wavelength laser as a laser beam or optical system of high numerical aperture (NA) was used, the energy density of the laser beam in record film 4 became very high, car angle-of-rotation thetak at the time of playback decreased, and there was a problem that a signal property deteriorated. On the other hand, heat can make it spread through the thermal control film 1 from a spot with the high temperature on the record film which was able to condense and do the laser beam 9 by forming the thermal control film 1 in a substrate 2 side directly between two fields of record film 4. Thereby, the temperature of the spot on record film 4 can be lowered to a suitable value. Moreover, diffusion of heat is made also with the reflective film 6 through a dielectric film 3. Therefore, temperature of the spot on record film 4 can be made into the optimal range by choosing appropriately the construction material and thickness of the reflective film 6 as the construction material of the construction material of the thermal control film 1 and thickness, and a dielectric film 3 and thickness, and a list.
[0027] Below, the manufacture approach of the optical record medium concerning this invention is explained. In this manufacture approach, the reflective film 6 is first formed by the spatter on a substrate 2. As a target in the case of a spatter, it uses simultaneous [an AgPdCu alloy and two aluminum metals]. By this spatter, the reflective film 6 serves as an AgPdCuAl alloy. The content of aluminum in this reflective film 6 is 50 % of the weight. Moreover, the spatter conditions of this reflective film 6 are as being shown below.
It is among Ar ambient atmosphere and is gas pressure:0.18Pa power AgPdCu:0.2kWAl. : 0.6kW
[0028] In addition, although some thermal conductivity worsens as compared with an AgPdCu alloy (it mentions later), surface smooth nature of reflective film 6 which consists of this AgPdCuAl alloy improves. Moreover, as for surface roughness Ra of this reflective film 6, it is desirable that it is 0.75nm or less. Moreover, as for the content of aluminum contained in an AgPdCuAl alloy, it is desirable that it is in 20 - 80% of the weight of within the limits. About the optimal range of the presentation of an AgPdCu alloy target, and the content of Pd and Cu which are contained in this AgPdCu alloy, it mentions later.
[0029] Moreover, an AgPdCu alloy simple substance can also be used as reflective film 6. When an AgPdCu alloy is used as reflective film, there is an advantage that what is necessary is to use only one

target in the case of a spatter. About the description of the optimal range of the presentation of this AgPdCu alloy target, and the content of Pd and Cu contained in this AgPdCu alloy, spatter conditions, and thermal conductivity and front-face nature, it mentions later.
[0030] Next, a dielectric film 3 is formed by the spatter on the reflective film 6. This dielectric film 3 is good also as a cascade screen more than two-layer by the need. Here, the spatter conditions of a dielectric film 3 are as being shown below.
Ar and N2 It is among a mixed ambient atmosphere and is gas pressure:0.3-0.4Pa power:1.0-1.5kW
[0031]. Next, the thermal control film 1 is formed by the spatter on a dielectric film 3. The target used for this spatter is an AgPdCu alloy, Pd contained in this alloy is 0.92 % of the weight, and Cu is 1.0 % of the weight. Moreover, the spatter conditions of this thermal control film 1 are as being shown below.
It is among Ar ambient atmosphere and is gas pressure:0.18Pa power:0.5kW[0032]. The metal thin film which consists of this AgPdCu alloy has good thermal conductivity, and it is [surface smooth nature] excellent. Moreover, in addition to this, it excels also in adhesion and corrosion resistance. In addition, as for surface roughness Ra of the thermal control film, it is desirable that it is 0.75nm or less. Moreover, as for the presentation of an AgPdCu alloy, it is desirable that there is Pd and Cu is in 0.5 - 1.5% of the weight of the range 0.5 to 1.5% of the weight.
[0033] Next, record film 4 is formed by the spatter on the thermal control film 1. This record film 4 is good also as a cascade screen more than two-layer by the need. Here, the spatter conditions of record film 4 are as being shown below.
Ar gas pressure: Two-layer film of 0.2 - 0.3PaTbFeCo and GdFeCo [0034] Next, a dielectric film 5 is formed by the spatter on record film 4. This dielectric film 5 is good also as a cascade screen more than two-layer by the need. The formation approach of a dielectric film 5 is the same as the approach which described the dielectric film 3.
[0035] Next, the organic substance protective coat 7 is formed on a dielectric film 5. This organic substance protective coat 7 is formed with a spin coat method.
[0036] Assessment as MO media was performed that the effectiveness should next be checked about the optical record medium concerning this invention. What carries out the laminating of the film configuration to the order of a substrate 2, the alloy reflective film 6 (Ag alloy etc.), dielectric films 3 (SiN etc.), the thermal control film 1 (AgPdCu etc.), record film 4 (TbFeCo etc.), and a dielectric film 5 (SiN) is used for the used optical record medium. Specifically, the thing in which a substrate, AgPdCuAl (50nm), SiN (20nm), the thermal control film AgPdCu (8nm), TbFeCo (12nm), and GdFeCo (5nm), and SiN (60nm) were formed was used. In addition, as a substrate, the track pitch 0.39micrometer thing was used by the product made from a polycarbonate of 1.2mm thickness.
[0037] As mentioned above, two samples were produced in order to compare the thing (sample 1) using AgPdCu as thermal control film with its property. That is, one of them is what used aluminum metal as thermal control film (sample 2), and other one is what did not prepare the thermal control film (sample 3). Here, in samples 2 and 3, conditions, such as formation of other cascade screens, are the same as that of a sample 1.
[0038] Here, linear velocity was made into 5.6 m/s using the optical system of numerical-aperture (NA) =0.85. Moreover, these data were measured in the groove section of a land groove substrate. Moreover, the playback power Pr sets to Pr=1.0mW, when the thermal control film is AgPdCu, it is Pr=0.85mW and aluminum and Pr=0.7mW and the thermal control film are not used, and it was made for the return quantity of light (Pull-in Level) to become fixed altogether.
[0039] Here, the reason for having fixed the return quantity of light is explained. If the reflection factors of the magneto-optic-recording medium to a laser beam differ, the magnitude of the noise to generate will also change. For example, if a reflection factor becomes high, while a carrier increases, a noise will also increase. Therefore, even if it compared each noise level, it enabled it to compare relatively the noise level of the magneto-optic-recording medium by which reflection factors differ by making the return quantity of light regularity about the magneto-optic-recording medium by which reflection factors differ, that it is hard to compare relatively, since it is easy there.
[0040] An elimination noise and surface roughness Ra were measured as evaluation criteria. The

measuring device (trade name: R3261A SPECTRUM ANALIZER, ADVANTEST CORP. make) was used for the elimination noise level. Here, the noise level was measured after carrying out DC erasion in an one direction.

[0041] When surface roughness Ra is called arithmetical mean deviation of profile, and sampled the part of measurement die-length L in the direction of that center line from the roughness curve, the direction of the X-axis and longitudinal magnification is expressed with a Y-axis and a roughness curve is expressed with y=f (x) for the center line of this sampling part, it integrates with the absolute value of a roughness curve, and is defined as the value which broke that integral value by measurement die-length L.

[0042] Measurement of surface roughness Ra used the atomic force microscope AFM (Atomic ForceMicroscopy) (trade name: SPM NANOSCOPE III, digital INSU vine face company make).

[0043] The measurement result of the elimination noise level about the above-mentioned samples 1-3 is as being shown in drawing 2 . Drawing 2 is drawing having shown the relation of the elimination noise level and frequency of (C), when the thermal control film is AgPdCu, (A) and the thermal control film are aluminum and there is no thermal control film in (B) and a list. In drawing 2 , the relative comparison between magneto-optic-recording media can be carried out by comparing the height of an elimination noise level in the range of frequency 10MHz or less.

[0044] When aluminum is used for the thermal control film, a noise level becomes high so that drawing 2 may show, but when AgPdCu is used compared with it, compared with a thing without the thermal control film, a noise is hardly increasing. Moreover, about samples 1 and 2, when surface roughness Ra was measured, in AgPdCu, it was very as small as Ra=0.56nm to the thing with large Ra=2.0nm and surface roughness Ra in the case of aluminum.

[0045] Thus, in a surface reading magneto-optic-recording medium, it turns out that it is what is depended on the surface roughness of a thermal control film ingredient like the time of the reflective film that a noise level changes with the thermal control film used as the substrate of record film (MO film; TbFeCo, GdFeCo). Thus, a disk noise can be reduced by using AdPdCu as thermal control film in a surface reading magneto-optic-recording medium.

[0046] According to the gestalt of operation of this invention, direct record film is formed on the thermal control film, and the thermal control film which has smooth front-face nature with high thermal conductivity can be obtained from the above thing with a substrate by using an AgPdCu alloy thin film as thermal control film by the optical exposure from an opposite hand in the optical record medium with which informational record or playback is made. Thereby, a disk noise can be reduced while a heat characteristic is improvable.

[0047] That is, in a surface reading magneto-optic-recording medium, even if it uses short wavelength laser as a laser beam or uses optical system of high numerical aperture (NA), degradation of car angle-of-rotation thetak at the time of playback can be prevented, and reduction in a carrier can be avoided. Moreover, in these media, also when a reflection factor is low, big playback power can be supplied, and MO signal can be reproduced. That is, since diffusion of heat becomes easy by formation of the thermal control film, the energy density of a laser beam can be enlarged as a result. Therefore, even when a reflection factor is low, it can fully respond.

[0048] In addition, in the gestalt of implementation of invention mentioned above, although the so-called disc-like magneto-optic disk was explained, this invention is not restricted to such a magneto-optic disk or a configuration, and can be applied to various kinds of optical record media which have a metal thin film in an information layer, such as a record medium of the shape of the phase-change optical disk which has the magneto-optic disk which has an information layer more than two-layer, a monolayer, or an information layer more than two-layer, the other shape of a card, and a sheet.

[0049] Moreover, the information layer more than two-layer is formed, for example on two transparence substrates, respectively, the field of these transparence substrate can be made to be able to associate, and can be joined and formed, and it can consider as various structures -- it can consider as the configuration which was made to perform an optical exposure from the transparence substrate and the opposite hand.

[0050] Moreover, as for this invention, it is needless to say that various configurations can be taken in

addition to this, without deviating from the summary of not only the gestalt of above-mentioned operation but this invention.

[0051]

[Effect of the Invention] This invention does so effectiveness which is indicated below. Direct record film is formed on the thermal control film, and with a substrate, by using an AgPdCu alloy thin film as thermal control film by the optical exposure from an opposite hand in the optical record medium with which informational record or playback is made, while a heat characteristic is improvable, a disk noise can be reduced.

[Translation done.]